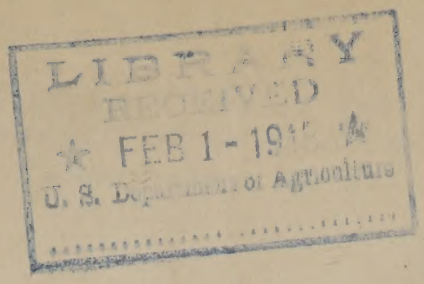

N E W S L E T T E R

OF THE

B U R E A U O F E N T O M O L O G Y

U. S. DEPARTMENT OF AGRICULTURE.

NUMBER 1.

MARCH, 1914.

3111 e

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY
WASHINGTON, D. C.

February 28, 1914.

To the Men of the Bureau of Entomology:

This is the first News Letter covering the activities of the whole Bureau. Professor Webster's experiment of a monthly News Letter, for the information of the men engaged in his section of our work, has proved so interesting to the men and so helpful to them that it has been decided to adopt the idea for the entire entomological service. It will be noticed that Professor Webster's portion of this letter contains some notes sent in by field workers concerning methods. I think that this is a good idea. When field men think that they have hit upon a new method which will be of use to other field men in their own or other branches of our work, I hope that they will send in a condensed note for use in one of these News Letters.

In my occasional visits to the field laboratories in different parts of the country, I have found that the men frequently knew almost nothing about what was going on at other stations and in other investigations. This monthly letter, which is now starting, I hope will result in a much more general knowledge of our work and will help to establish more firmly the esprit de corps which I am sure already exists in no small degree among all the workers of the Bureau.

L. O. Howard,

Chief of Bureau.

The Committee on Efficiency of the Bureau of Entomology is composed of the following employees:

C. L. Marlatt, Chairman,
R. S. Clifton,
F. M. Webster.

The Committee on Projects of the Bureau of Entomology is composed of the following employees:

A. L. Quaintance, Chairman,
C. L. Marlatt,
W. D. Hunter.

Members of the force who wish copies of the First Progress Report of the Thompson-McFadden Pellagra Commission, which contains the report of A. H. Jennings and W. V. King on "An Extensive Study of Insects as a possible Etiological Factor in Pellagra," can obtain one by sending the postage (5¢) to Mr. R. S. Clifton, of the Bureau at Washington.

PUBLICATIONS.

On July 1, 1914, the series of bulletins and circulars of the several Bureaus and offices of the Department of Agriculture were discontinued and a general or departmental series to take the place of them was started. The Technical Series of the Bureau of Entomology was also discontinued and such entomological matter of this nature as is to be published by the department hereafter (i. e., technical matter which is the result of original research) will appear in the new Journal of Agricultural Research.

The concluding number of the circular series is No. 173; of the bulletin series, No. 127, and of the Technical Series, No. 27. Bulletin No. 123 has just been issued, and Technical Series No. 26 will be issued in a week or so; these two will fill up the gaps in the two series.

As several of the bulletins and technical series bulletins which have been issued in parts are still incomplete, the bureau is to be permitted to complete these and this will be done during the next few months. Each of these bulletins, when complete, will consist of at least two parts and will have in addition an index or a Contents-and-Index part. (An exception to this rule is Bulletin No. 83, which cannot, under the new plan of publication for the Department. Part I will be the only part of this bulletin issued, and there will be no index part.)

Persons on the domestic and foreign mailing lists for publications of the Bureau of Entomology will hereafter receive the Farmers' Bulletins, Bulletins of the departmental series, and Yearbook separates relating to entomology and the Annual Report of the Chief of the Bureau and will also receive separates of the entomological papers published in the Journal of Agricultural Research. The Journal itself is not sent to persons, but only to libraries, although it can be purchased from the Superintendent of Documents for $2.00 a year.

It may not be generally known that field men who so desire may be placed on the "Official mailing list" of the Office of Experiment Stations. To all on this list are sent the Experiment Station Record, the monthly list of Publications of the U. S. Department of

Agriculture and the Bulletins of the various State Experiment Stations. A corrected list of addresses on this"Official" list is sent each month to all the State stations from the Office of Experiment Stations. As it takes about three weeks to get an address on this list changed and into working order it is preferable for a man changing his location frequently to have his address read "Bureau of Entomology, Washington, D. C." and to have publications forwarded to him from the Bureau. But a man who moves only once a year can have his address changed for all State experiment publications simply by making the request to the Chief Clerk, Office of Experiment Stations, Washington, D. C. Men not on this "Official list" (which is not intended for men permanently located in Washington and having access to the libraries there) who desire publications from the various State experiment stations must request them from each station individually and must write to each station individually when change of address is desired.

LIBRARY.

With regard to books loaned from the Department and Bureau libraries to men in the field it is always desireable that they be used at once and returned promptly that other users may be as little inconvenienced as possible.

New Books.

Barbey, Auguste. Traite d'entomologie forestiere. Paris, 1913. 624p.

Reh, Ludwig. Die tierischen Feinde. (Sorauer, Paul. Handbuch der Pflanzenkrankheiten v. 3, 1913.

Review of applied entomology (monthly) Ser. A. Agricultural; Ser. B.(Medical) Issued by the Imperial Bureau of Entomology, Messrs. Dulau & Co., Ltd., 37 Soho Square, London W. 12s per annum. post free. or Series A (Agricultural) 8s and Ser. B. (Medical and Veterinary) 5s.

This gives excellent reviews and summaries, especial attention being paid to Russian economic material. v. 2, No 1 Jan. 1914.

PREPARATION OF ACCOUNTS.

The attention of all employees concerned is called to the following amendments to the Fiscal Regulations, copies of which have already been distributed. If you failed to receive them you should apply for copies at once:

Memorandum No. 63, January 28, 1914 - Subvouchers must be secured for Laundry Charges.

Memorandum No. 64, January 28, 1914 - Per Diem Allowance in Lieu of Subsistence Expenses.

Memorandum No. 65, January 28, 1914 - Shipment of Household Goods and Live Stock Owned by Employees Transferred from One Station to Another.

The attention of all employees concerned is again called to the importance of forwarding their monthly reports with their expense accounts immediately after the close of each month. Where no expenses are incurred a note to that effect should be sent with the monthly report.

Duplicate copies of transportation requests should be forwarded to the Bureau on the day on which they are used and not held for the completion of the voucher. They should be legible and the cost of each should be accurately ascertained and plainly written.

The number of every expenditure authorization issued during the fiscal year should be inserted in space for that purpose on the voucher and should appear in chronological order.

All fixed charged such as rent, telephone, and monthly livery bills should be stated on white vouchers (Form 5). All other livery charges should appear in expense account to check with travel, and when a monthly livery agreement is in force, some reference to this agreement should be made when this livery is used in place of the ordinary hire of a team.

When bill of lading is used the "Memorandum Bill of Lading" should be mailed to the Bureau immediately, and every effort should be made to ascertain as nearly as possible the amount to be charged for the shipment, in order that a correct account of liabilities may be had at all times. This amount should be stated on the Memorandum Bill of Lading under heading "estimated cost".

Before incurring unusual expenses such as are not incident to regular travel, see that letter of authority specifically authorizes them. Fiscal Regulations, paragraph 18.

In the preparation of accounts (See pages 43 to 46, Fiscal Regulations), every move of the traveler should be shown and by what means of conveyance the move was made, i. e., by steam railroad (giving the initials of the railroad, Fiscal Regulations, Par. 14 (b),) livery, motorcycle, bicycle, automobile, or on foot. The omission of this essential has caused great inconvience. For example a meal is charged at one point and the next meal at a different point without showing that a trip was made to the latter point.

In stating a claim for per diem in lieu of subsistence, care must be taken to show the day and hour of returning to station. Also see that the account as stated will show at what points the per diem is claimed. See Fiscal Regulations Par. 16. Memorandum 64, Secretary's Office, based on Comptroller's Decision, divides a day into 4 equal parts - Breakfast, dinner, supper and lodging, and hereafter claims for per diem will be computed by quarter days - especially the first and last days of a trip.

It has been noted that there is a growing tendency on the part of employees, who are engaged in the field in work for this Bureau, to extend and broaden the meaning of the words, "Miscellaneous Supplies," when inserted in a letter of authority, to such an extent that it endangers the records of the Property Clerk, and arouses the liability of having the Treasury reverse the Auditor's decision. Therefore, in the future, it will be the intention of this office in placing such words as "Miscellaneous Supplies" in your letter of authority, to permit the purchase of such items of small cost as are immediately needed, and will be utilized, expended, or consumed. Such items of greater cost as will be of permanent use and add to the outlay, or increase the investment, will be considered equipment, and should not be purchased under your letter of authority but upon requisition through the Property Clerk.

BEE CULTURE.

E. F. Phillips, in charge.

Doctor E. F. Phillips, in charge of bee culture investigations and Mr. Geo. S. Demuth are conducting investigations on the temperature of the bee colony in winter, at the Zoological Laboratory of the University of Pennsylvania, at West Philadelphia.

Doctor Phillips attended the annual Meeting of the National Beekeepers' Association held at Saint Louis, Mo., during the week of February 16th. to 21st.

CEREAL AND FORAGE INSECT INVESTIGATIONS.

F. M. Webster, in charge.

Laphygma frugiperda may be found at Brownsville, Tex., in all stages every month in the year, although it is difficult to find it in winter months. It injures corn especially, but is also found on sorghum and alfalfa, and occasionally on sugar cane and Bermuda grass. Corn grown in the fall is most seriously injured.

It is not possible to trace a definite number of generations. The egg stage varies from 2½ to 12 days, the larval stage from 12 to 35 days and the pupal period from 7 to 35 days. In the winter months the frosts and cold "northers" are the principal checks on the multiplication of the species, but from May until November it occors in large or small numbers according to the abundance of its parasites.

The most important work to be done here on this species is a study of its parasites, of which eleven species occur. A thorough study of these parasites extending over several years will probably reveal the reason for the occasional outbreaks which cause so much damage in the eastern and northern States. The parasites found at Brownsville are: Meteorus laphygmae, Rhogas laphygmae, Apanteles harnedi, Zele melleus, Chelonus texanus, Ophion bilineatus, Euplectrus platyhypenae, Limnerium dubitata, Pristomerus appiachianus, Meteorus sp., and the Tachinids, Frontina archippivora, and Archytas piliventris. We know the life history of the following parasites: Meteorus laphygmae, Apanteles harnedi, Chelonus texanus, Ophion bilineatus, Euplectrus, platyhypenae, and Limnerium dubitata. The seasonal history of the parasites is important and interesting, and is worth a thorough study. Alternate hosts should be looked for especially. All of the parasites are not present all of the time. Usually three or four species are dominant and the others occur in small numbers. Some of the important species are rare at times. We have made very thorough collections the past summer and have not found the Tachinid, Frontina archippivora or the Braconid, Rhogas laphygmae. The latter parasite was numerous last year. The results of our work here collecting larvae and rearing parasites emphasize the importance of thorough collections extending over a period of several years before making definite statements as to which parasites are present or as to the relative importance of any one species. From the work done during the past year we would say that Rhogas laphygmae, which was numerous in 1912, is not found at this place. An attempt to introduce it would almost certainly prove successful as it is probable that it will be found here again.

Limnerium dubitata and Apanteles harnedi were very numerous

near Brownsville the past spring but we have not collected Limnerium since May 28. Meteorus laphygmae, which was rare in the spring, was numerous during the fall and is appearing in collections made the latter part of December. Euplectrus platyhypenae was numerous the latter part of May but has not been collected in numbers since. Archytas piliventris was present in the spring, rare during the summer, and numerous in the fall. Meteorus was found here in large numbers in 1912 and Mr. Smythe reared the following parasites from the cocoons: Spilochalcis delira, Spilochalcis pallens, Myrmicomorpha perniciosa, Dibrachys meteori, Hemiteles sp., Mesochorus sp., Eupelminus meteori. During the year 1913 this species was not so numerous and we collected none of its parasites. Four of the Meteorus parasites - Myrmicomorpha perniciosa, Spilochalcis pallens, Dibrachys meteori, and Hemiteles sp. were reared from Rhogas laphygmae by Mr. E. G. Smyth.

METHODS USED IN THE STUDY OF LAPHYGMA.

Larvae are collected from the field and divided into two lots. The 5th and 6th stage larvae are put in one lot, and those in the 4th stage and under are put in another lot. These larvae are all isolated in one-ounce tin salve boxes and are examined every day or every other day as seems necessary. It is necessary to isolate the larvae to keep them from eating one another. The tin boxes are easily handled by stacking them 5 high on panes of glass, usually one hundred in a lot, and one note is made for each lot. A record is kept of the numbers which emerge of each species of parasite, and of the number which die of fungus or of bacterial disease. The used tin boxes are thrown into a box from which they are later removed by the Mexican laborer and cleaned and sterilized by boiling water.

Ophion bilineatus, Frontina archippivora, and Euplectrus platyhypenae, are secured usually from the larvae in the 5th and 6th stages. Archytas piliventris emerges from the pupae formed from the larvae collected in the 5th and 6th stages. Meteorus laphygmae, Rhogas laphygmae, Apanteles harnedi, Zele melleus, Chelonus texanus, Limnerium dubitata, and Pristomerus appalachianus emerge from the larvae in the 3rd and 4th stages.

In order to carry on life-history work with the parasites it is necessary to keep Laphygma in the laboratory in all stages at all times so that material will be ready when parasites are secured. Laphygma adults are kept in cages made of large No. 2 street lamp globes set on glass and covered with glass. The moths are feed on thin sugar syrup which is put in the cages on blotting paper. They are fed the first day and at night corn leaves are put into the cages for them to lay their eggs on. The eggs are removed each morning and placed in tin boxes and labeled and are afterwards examined twice a day and the time of hatching recorded. The larvae which hatch are reared in large numbers in 4-ounce tin boxes and are later placed in battery jars.

Larvae to be infested with parasites are confined in large vials or in battery jars and are left one or two days with the parasites, after which they are isolated in 1-ounce tin boxes. The battery jars seem to be preferable, as the parasites sometimes do not mate in the vials.

We have had little success with wire cages of any kind as

they allow corn leaves to dry out too quickly. They are also difficult to sterilize. The battery jars, lantern globes, vials, and petri dishes are easily cleaned and sterilized, and the corn will keep for several days in them.

For the study of Tachinidae, especially of Archytas piliventris, we provided ourselves with the same kind of cages used for this work in the Gipsy moth laboratory, as follows: A large outside cage 6' X 6' X6', a large cage 2' X 2' X 2', similar to the Riley cages, and several of the small circular cages which were found to be successful in the work at the Gipsy moth laboratory. We were not able to use with success either these cages or the ordinary cages we use here for other purposes. The large outside cage and the large Riley cage were unsuccessful here as they were at the Gipsy moth laboratory, for the reason that the flies killed themselves by flying against the sides of the cages. The large lantern globes were unsuccessful for the same reason. The small round cages were unsuccessful for the reason that the corn dried too quickly in them and also only a few larvae can be confined in such small cages because they eat one another. Glass cages 4" X 4" X 4" were tried and were more useful than the other forms, but were not a decided success. The fact that it was necessary to have a cage in which the flies could not fly about much and which would at the same time afford room enough so that the Laphygma larvae would not encounter one another frequently, suggested the idea of a low tray-like cage. Photographic trays, 9" X 11" were first used with success. These were later replaced by trays made of glass 1¼" X 15" X 15" which were set on glass and covered with glass. From 20 to 30 larvae in the 5th stage may be placed in these cages and only a few of them will be killed. Corn leaves may be kept in them several days without drying. The flies do well in them and are easily handled.

FUTURE WORK ON LAPHYGMA AT BROWNSVILLE.

It seems important to continue the work of collecting larvae and rearing the parasites, in order to get the seasonal history of the parasites and their relative abundance at different times of the year.

The work on the life histories of the parasites is to be continued until the life histories of all of them are well known. Spraying experiments are to be carried on to determine if any practical advantage can be gained by spraying corn for these species in this locality. We now know enough about the life history of this species and its parasites so that all the work may be carried on intelligently.

All the work outlined above can be carried on with the apparatus we are using and by methods we have already worked out. R. A. VICKERY.

Mr. Geo. G. Ainslie is working in Florida with headquarters at Orlando.

Mr. Chester F. Turner of the Kansas Agricultural College has been appointed to this Division and assigned to the Greenwood, Miss., Station.

Mr. J. J. Davis spent a few days in the office, working on manuscript and consulting the library and Museum collections.

Mr. P. H. Timberlake is spending some time in Washington, doing some work on parasitic Hymenoptera in connection with his investigations at Salt Lake City, Utah.

In submitting material for determination, the name of the host

plant should always be given; and in submitting parasites for determination, it is of great assistance and of much importance as a record for the one who makes the determination, to have the name of the host insect submitted with it. F. M. WEBSTER.

Relative to labels written in waterproof ink, why is it necessary to immerse first in either absolute or 95% alcohol before placing in a weaker percent of alcohol, when it is just as satisfactory to immerse the labels in the vial of alcohol they are intended for, direct? The only requirement is that the label be dry before immersing. J. J. DAVIS.

Dr. J. M. Alarich has returned to La Fayette, Ind., after completing his studies of the Sarcophagidae.

Mr. Desla Bennion has resigned from the Salt Lake, Utah Station.

The February news letter included mention of an innovation being carried out by the C. B. & Q. Railway Company with reference to the leasing of right of ways to farmers for alfalfa growing. It now appears that the Chicago and Northwestern Railway on its line between Hastings and Superior Nebr., along the South Platte River, has been leasing the right of way free of charge for the past five years. There are now 100 leases in force and about 400 acres are being used to raise alfalfa; and with the increase in popularity of this wonderful forage plant, the applications for leases are increasing. No fee is charged for the use of this land, but it is reserved to those farmers whose property adjoins the right of way of the Northwestern Railway. The plan has created a spirit of cooperation between the railroad and the farmers interested, and has greatly improved the appearance of the right of way.

The cage we have found best adapted to hatching eggs of the mite Notophallus viridis and one that seems could be equally desirable for the incubation of insect or mite eggs of small size, is a tin salve box 50 mm in diameter and 20 mm deep, filled with the plaster paris and a cell made in the plaster. The box is filled full of thin plaster. A piece of glass 25 mm square - a piece of a common slide is best — is used for the cover to the cell. One corner is cut off so that one has no trouble in putting the lid on. The under edge of the glass is beveled to prevent material which collects underneath from holding it off the surface. This piece of glass is placed in the box lid and stuck there by means of library paste. Place the lid on tight, pressing the glass into the plaster and invert the box so that in setting, the surface next to the glass will be left free from bubbles. After about two hours, remove the lid and carefully pry the glass out of the plaster. The cell can then best be made by means of a steel drilling bit about $\frac{1}{2}$ or $\frac{3}{4}$ inch in diameter, turning the bit with the fingers. This bit makes a round smooth bottom so that one can see all parts of the cell and contents thorough the glass cover by using a binocular without disturbing the material within.

For insects that are not apt to escape when the lid is removed, a larger box with several cells in it is very satifactory. A tin box $4\frac{1}{4}$ by $3\frac{1}{4}$ by $1\frac{1}{4}$ inches with from 6 to 12 cells in the plaster under a common glass seems to regulate the moisture very well. Mr. D. J. Caffrey has used this kind of cage for hatching Isosoma grande eggs which have been dissected from wheat plants.

The writer has confined females of D. balteata and D. soror in the salve box plaster cages and secured eggs from each of these species but

it is not time for the eggs to hatch. It seems that is, for some purposes, an improvement over the one described by Mr. C. M. Packard in the last news letter for rearing Diabrotica, because one can examine the contents without any danger of the insects escaping. T. S. WILSON.

Mr. E. O. G. Kelly has returned to his field station at Wellington, Kans.

Mr. Philip Luginbill is spending some time in histological work at the Charlottesville, Va., laboratory.

We should like to have collections made of all large green Aphidae, the same preserved in 70 per cent alcohol, and, where possible, brief color notes given, as well as a complete lath on host plants. J. J. DAVIS.

Where possible to do so all uncopied notes on Macrosiphum pisi and Allorhina nitida should be sent in for copying, especially notes relating to distribution, parasites, and hosts, since papers are being prepared on both of these species.

This coming spring Lachnosterna beetles will be abundant in many parts of the country and collections should be made wherever possible. Anyone not supplied with a copy of "Methods of Collecting May-beetles" can secure same by writing the office. Mr Schwarz, who has collected in New Mexico and Arizona, tells us that beetles, including Lachnosterna, Listrochelus, etc., appear at the lights in July, at the beginning of the rainy season. We have no Lachnosterna beetles from either of the above-mentioned States, and collections are highly desirable.

It is very desirable that all field notes should state, specifically, whether or not specimens were preserved; whether pinned, slide mounted, or in alcohol; besides, the number of pinned specimens, slides, or vials should be noted. With this information on the note cards, it will oftentimes eliminate the necessity, on the part of those using these notes, for searching through the office collections to determine this point. Furthermore, it is always important in the case of insects belonging to groups like the Aphididae, which are so confused and difficult of determination, and most important of all, when the host is a new one, or the locality unusual. However sure of the identity of a species the observer may be, he should always bear in mind that it is the specimens that constitute absolute proof from which there is no appeal, in case future question arises.

In conducting molting experiments with Laphygma frugiperda the writer has found that test tubes are a great deal more satisfactory, convenient, and time-saving than small individual cages. The test tubes used can be purchased from Arthur H. Thomas Co., Philadelphia, and are listed in their Catalog F as #16922 "Non-Corrosive." They can be had in various sizes. The ones used by the writer were 150 mm. long and have a diameter of 20 mm. These test tubes are thick-walled and consequently do not break very easily when handled. Absorbent cotton was used to close the openings in the tubes; this absorbed all the surplus moisture which accumulated in the tubes. In case the food in the tubes became too dry [illegible] with water. By the use of these tubes the writer was able to run as many as fifty experiments at one time without much trouble. Another advantage in using tubes rather than individual cages for such experiments is that they can all be packed together and carried by the observer in a small case wherever he goes and can be

...ed as often as is necessary. This method has been used successfully in ... studies of larvae other than Lophyrus. PHILIP LUGINBILL.

DECIDUOUS FRUIT INSECT INVESTIGATIONS.

A. L. Quaintance, in charge.

Mr. A. I. Fabis, a graduate student of Columbia University, New York City, and formerly [illegible] at Cornell University, has been employed as Scientific Assistant and will assist Mr. John B. Gill in Georgian insect investigations, with headquarters at Monticello, Fla.

Mr. Benjamin R. Leach, a student at Cornell University, has been employed as Scientific Assistant in deciduous fruit insect investigations and will give special attention to habits, in orchards, of the woolly apple aphis and to experiments with remedies in the control of this insect. Headquarters [illegible].

Mr. John E. Dudley Jr., formerly connected with the Gipsy Moth Parasite Laboratory at Melrose Highlands, Mass., has been appointed as Scientific Assistant in the Bureau of Entomology, and assigned to work under the Insecticide and Fungicide Board. He will assist Mr. E. W. Scott in testing the efficacy claims of manufacturers as regards their insecticides, with headquarters at Vienna, Va.

Mr. W. F. Turner, Entomological Assistant, formerly assigned to work under the Insecticide and Fungicide Board, has been transferred to the Office of Deciduous Fruit Insect Investigations, and will assist Mr. Baker in studies of orchard plant lice.

Messrs. W. B. Wood and E. H. Seigler have been detailed for work during the spring months in California in connection with the Bureau's investigations and demonstration work in the control of the pear thrips.

Mr. L. L. Scott, Entomological Assistant, who was assisting Mr. A. C. Hammar in codling moth investigations in the Pecos Valley, New Mexico, resigned from the Service February 14, 1914.

The studies of the codling moth in the Allegheny region, which have been under way during the past [illegible], under the immediate charge of Mr. Fred E. Brooks, have been concluded, and a report upon the investigation is now practically completed.

A detailed account of the life history and structure of the woolly apple aphis, upon which work Mr. A. C. Baker has been engaged for the past two years, has been completed and a report submitted for publication.

The investigations under way during the past two years on the so-called terrapin scale, Eulecanium nigrofasciatum, under the immediate direction of Mr. F. L. Simanton, have been concluded and a report will shortly be issued.

FOREST INSECT INVESTIGATIONS.

A. D. Hopkins, in charge.

In this first letter Dr. Hopkins wishes to make a rather full statement of his work for the information of the men engaged in other branches.

The general projects in Forest Insect Investigations are:

1. Office and Laboratory.
2. Insects affecting forest growth.
3. Insects affecting the wood of [illegible]

and crude forest products.
4. Insects affecting unseasoned manufactured products.
5. Insects affecting seasoned and finished products.
6. Insects affecting utilized forest products.
7. Miscellaneous forest insects.
8. Study of the relation of insects to chestnut bark disease.

Locations, Personal and Work on Special Projects.

The executive office is in the Evening Star Building; the laboratories in the New National Museum and Star Building; the forest insect collections of alcoholic and pinned material with the pernament notes and records are in the forest laboratory room 31, New National Museum and in rooms occupied by specialists in the insect division of the Museum. The exhibit and part of the insect work collections are at the main Bureau building and at the Star Building.

The field work is conducted from Washington and from more or less permanently located field staticns.

Washington Offices and Laboratories.

Dr. A. D. Hopkins has charge of the investigations and in addition to the executive duties, is engaged in the systematic and economic study of the Scolytid beetles; also gives personal attention to certain specific and general projects on wnich he has done more or less work before and after he came to the Bureau- or are of such a broad nature to require his special attention, such as the investigation of insects affecting chestnut, hickory and ash growth and products; powder-post insects, insects affecting forest products in general; relation of climatic conditions to forest insect life including the relation of latitude and altitude to the periodical phenomena of plants and insects.

Mr. T. E. Snyder, is engaged in the systematic and economic study of Isoptera; in conducting experiments in chemical treatments of wood to prevent attack by Termites and powder post insects; and in general investigation of chestnut and chinquapin insects and insects affecting forest products.

Mr. F. C. Craighead, is engaged in systematic and economic study of Cerambycid larvae; investigation of the relation of insects to the chestnut bark disease; the relation of defoliated trees to subsequent attack by bark boring insects, with special reference to the Gipsy and Browntail Moths.

Mr. Jacob Kotinsky, is engaged in bibliographic, translation, and editorial work.

Mr. W. S. Fisher, is engaged in the systematic arrangement of the collection of forest Coleoptera and identification of forest Coleoptera other than Scolytidae with special reference to Buprestidae and Cerambycidae; also engaged in seasonal history studies of miscellaneous insects.

Mr. August Busck, is engaged in systematic investigation of forest Lepidoptera with special reference to Lepidoptera affecting chestnut and chinquapin, and has charge of the collection of Forest Lepidoptera and identification of species submitted to him; also has charge of the rearing and seasonal history work on Lepidoptera at the Eastern field station.

Mr. S. A. Rohwer, is engaged in the systematic and economic investigation of Forest Hymenoptera with special reference to Tenthredenoidea and Hymenoptera parasitica and those affecting chestnut and chinquapin; identifies species and has charge of the collections of Forest Hymenoptera; also spends much time at the Eastern field station.

Dr. Adam Boving, is engaged in anatomic study of Coleopterous larvae with special reference to Cleridae and Trogositae.

Mr. C. T. Greene, is engaged in the systematic and economic study of Forest Diptera with special reference to Diptera affecting chestnut and chinquapin. He has charge of the collection of Forest Diptera sand identifies species submitted to him; also spends much time at the Eastern field station.

The Eastern Forest Insect Field Station is located at East Falls Church, Va.; the field of operations including the states east of about the 100th. Meridian. Mr. S. A. Rohwer is in general charge and in addition to his systematic work at the Museum laboratory gives special attention to the rearing of hymenoptera and the study of seasonal histories with special reference to chestnut insects.

Mr. H. B. Kirk, is engaged in rearing Forest Coleoptera and in seasonal history work with special reference to chestnut insects, and does the general photographic work for the station.

Mr. C. T. Greene, in addition to his systematic work at the Museum laboratory, gives special attention to the rearing of Diptera and to seasonal history work with special reference to chestnut insects.

Mr Carl Heinrich, is engaged in rearing Forest Lepidoptera and in seasonal history work with special reference to chestnut insects.

Mr. Wm. Middleton, is engaged in rearing Forest Hymenoptera and and the systematic and economic study of gall insects with special reference to those affecting chestnut and chinquapin.

The Northern Rocky Mountain Forest Insect Field Station is located at Missoula, Mont., with the field of operations including the States of Montana, Idaho, eastern Oregon, eastern Washington, Wyoming, Nebraska, and South Dakota, north of the 42d Parallel of latitude. Mr. Josef Brunner, Entomological Assistant is in charge of the station and is engaged in the investigation of the seasonal history and habits of the Sesiid pitch moths which affect coniferous reproduction and cause defects in the wood of trees; also investigation of the interrelation of forest fires and insects and is in charge of local experimental and demonstration control work. Entomological Rangers Albert Wagner, James Fleming and L. O. Swartz are engaged in collecting specimens, cruising and reporting on forest areas in which insect depredations are in progress and giving instructions on practical details of control operations to forest rangers and private owners under special instructions from the officer in charge of the station.

The Pacific Slope Forest Insect Station is located at Placerville, California, with the field of operations including the states of California, western Oregon, and western Washington, west of about the 120th. Meridian. Mr. H. E. Burke, Entomological Assistant is in charge of the station and is engaged in the systematic and economic study of Buprestid larvae, the relation of mistletoe on living trees to attack by insects, general seasonal history work and in charge of local experimental and demonstration control work. Entomological Rangers, J. D. Riggs, J. J. Sullivan and W. D. Glendinning are engaged in collecting specimens, cruising and reporting on forest areas in which insect depredations are in progress and giving instructions on practical details of control operations to forest rangers and private owners under special instructions from the officer in charge of the station.

The Pacific Slope Substation is located at Ashland, Ore. with the field of operation including the Pacific Slope and Rocky Mountain States. Mr. J. M. Miller, is in charge and is engaged in the investigation of insects affecting coniferus seeds. Mr. P. D. Sergent, Entomological Ranger is engaged in the collection of material for Mr. Miller and in rendering assistance in the seasonal history studies of cone insects; also cruises and reports on forest areas in which insect depredations are in progress and gives instructions on practical details of control operations to forest rangers and private owners under special instructions from the officer in charge of the station.

The Southern Rocky Mountain Forest Insect Station is located at Colorado Springs, Colo., with the field of operations including the states of Colorado, New Mexico, Arizona, Utah and Nevada. Mr. W. D. Edmonston, is in charge of the station and engaged in the study of lightning-struck trees in relation to primary and secondary forest insect infestation; general seasonal history work and in charge of local experimental and demonstration control work. Mr. B. T. Harvey, is engaged in the investigation of damage by wood-boring insects to fire and insect-killed trees. Mr. A. B. Champlain, is engaged in the study of the seasonal history of predatory insects and their relation to bark and wood boring insects with special reference to cleridae, Trogositidae, Hypophloeus, Alonium etc. Mr. Geo. Hofer, Entomological Ranger, is engaged in the collection of specimens, cruising, and reporting on forest areas in which insect depredations are in progress and gives instructions on practical details of control operations to forest rangers and private owners under special instructions from the officer in charge of the station. Mr. Morris Chrisman, Entomological Ranger, has been engaged in the collection of rearing material in the mountains of southern Arizona for the eastern field station. He is now connected with the Southern Rocky Mountain Station but will remain in the southern area to continue his work of collecting material for the specialists. The Gipsy Moth Parasite Laboratory and the Branch of Forest Insects are cooperating in the investigation of the relation of bark-boring insects to the death of oak trees defoliated by the gipsy moth and browntail moth caterpillars, in which Mr. H. A. Preston is assigned from the laboratory to work under instructions from Dr. Hopkins and Mr. F. C. Craighead of Forest Insects in general charge of the in-

vestigation of the bark-boring insects and experimental control work.

One of the special features of the seasonal history work on forest insects is to note the periodical events in the activitives of species of insects with those in the seasonal activities of their host tree species at the same locality. The object being to secure data from as many different localities as possible in a wide range of latitude and altitude on which to base conclusions as to the events in the seasonal activitives of a tree species which will serve as the best guide to coincident events in the seasonal history of one or more species of its insect enemies.

PREVENTING SPREAD OF MOTHS.

A. F. Burgess, in charge.

Mr. Harry W. Allen, a graduate of Massachussetts Agricultural College, has been appointed as Scientific Assistant and is engaged on experimental work at the Gipsy Moth Laboratory, Melrose Highlands, Mass.

Mr. Ray T. Webber has been appointed as Scientific Assistant, and is assisting in the experimental work at the Gipsy Moth Laboratory.

The field work has been handicapped the last two weeks by the heavy fall of snow and zero weather. Scouting parties have been transferred from Maine and Northern New Hampshire to Rhode Island, Connecticut, and southern Massachusetts, but even here heavy snow has seriously interfered with the work. A number of parties have been detailed to scout the outside territory in Massachusetts and Connecticut for the purpose of determining whether new towns are infested by the brown-tail moth.

A small outbreak of the brown-tail moth has been found on Fisher's Island, New York, a small island off the coast of Stonington, Ct., by inspectors employeed by the New York Department of Agriculture.

The gipsy moth infestation at Geneva, N. Y., has been thoroughly scouted this winter and no egg clusters have been found. Several of the scouts were detailed to examine the trees in the city park in Rochester, N. Y., but no infestation was found.

A small infestation of the gipsy moth has been found in a suburb of Cleveland Ohio, and the territory is being examined by several scouts employed by this office. An attempt will be made to exterminate this infestation by this office and the Ohio State Nursey Inspector.

Thinning work of experimental plots which are being operated to determine the effect of the gipsy moth on various stands of forest growth is approaching completion. This line of work is being supervised by Mr. G. E. Clement.

A meeting of the men engaged in experimental work was held at the Gipsy Moth Laboratory, Melrose Highlands, Mass., on Feb. 20th and 21st, for the purpose of discussing the different phases of the work prior to making plans for experiments for the coming summer.

An arrangement has been made at the request of Doctor C. Gordon Hewitt, Dominion Entomologist, Ottawa, Canada, so that the parasites and natural enemies of the brown-tail moth can be collected and shipped to New Brunswick and Nova Scotia during the coming summer. Doctor Hewitt will furnish men to make and handle the collections, and space and such assistance as may be necessary will be furnished at the laboratory.

SOUTHERN FIELD CROP INSECT INVESTIGATIONS.

W. D. Hunter, in charge.

Specimens of thrips for determination should be sent to Mr. A. C. Morgan who will be in Washington until March first and thereafter at his regular field station at Clarksville, Tenn.

Messrs. W. V. King and H. P. Wood left Washington during February for the Bitter Root Valley in Montana where they will be engaged in the eradication of the spotted fever tick during the season. This work is in cooperation with the Montana State Board of Entomology, and the U. S. Public Health Service.

Mr. D. L. Van Dine made a trip to Madison Parish, La., during the month for the purpose of making observations on the winter habits of Anopheles, and to perfect arrangements for the work of the season which will be conducted there.

Mr. G. N. Wolcott, who is engaged on the cooperative work for the Bureau and the Porto Rican Board of Agriculture, has spent several weeks in Cuba studying the parasitism of the moth borer. In a short time he will proceed to Jamaica on the same investigation and will return to Illinois during March.

TRUCK CROP AND STORED PRODUCT INSECT INVESTIGATIONS.

F. H. Chittenden, in charge.

Mr. Roy E. Campbell, B. S., 1913, University of California, has accepted an appointment in the branch of Truck Crop and Stored Product Insect Investigations.

Mr. Curtis P. Clausen, B.S., 1914, University of California, has accepted an appointment in the branch of Truck Crop and Stored Product Insect Investigations. Headquarters at Berkeley, California.

Mr. Boyd L. Boyden, who pursued a course in biology at Pomona College, Claremont, Cal., graduating as B.S. in 1912, has been transferred from work on tropical and subtropical insect investigation to the branch of Truck Crop and Stored Product Investigations, with temporary headquarters at Whittier, Calif.

One of the most promising projects which has met with favor from several reliable sources is the construction of a power sprayer of light weight to satisfy the different conditions on Long Island, Indiana and Texas. One is specially designed to weigh about 300 pounds and suitable for placing upon a wagon bed or two-wheeled truck to be driven through truck fields through which it might otherwise sink too deeply, because of the weight necessary to carry the entire equipment. It is expected that outfits of this type will soon be placed on the market. A second type, also a power sprayer, is to be especially adapted to the spraying of onions, especially in soft cultivated fields, in muck ground, where onions are grown in northern States, e.g., Indiana. The third form is to be constructed with a view to travelling through the truck crop regions of such States as California and Colorado, the machine to be adapted to somewhat different purposes than the other two specified.

Fumigation with the standard fumigants will be continued, especially with a view to obtaining a correct or approximate method of standardization. The older and standard remedies, such as carbon bisulphid and hydrocyanic-acid gas, will be continued with this end in view. Heat

will be tried under varying conditions for the same purpose and certain new fumigants will be tried in comparison with the older and better known present standards. Effects on different insects under different conditions will form an important part of this work.

The work on the potato-tuber moth, one of the most destructive imported insects when it occurs in California and nearby States, lacks only the testing of certain new remedies and the checking of some of those already tested, to complete it. Its life history and natural enemies have been followed since the fall of 1912. During 1913 the cultural control methods were checked and in the main proved that the recommendations in Circular 162 and Farmers' Bulletin 557 were correct. Experiments as to the best manner of killing all stages of the insect where they already occur in potatoes are yet incomplete. It is the aim to accomplish this in one treatment but it is doubtful if this can be done without injury to the tubers. The remedies tested thus far have consisted of dipping in various solutions, and in fumigation. The main difficulty thus far encountered is in killing both eggs and larvae with a single treatment. It is possible that two separate treatments will have to be applied.

TROPICAL AND SUBTROPICAL FRUIT INSECT INVESTIGATIONS.

C. L. Marlatt, in charge.

Mr. R. S. Woglum, who is in charge of the field work of citrus fumigation in Southern California, has been in Washington for the past two months supervising various experiments conducted by the Bureau of Chemistry with different kinds cyanid used in commercial fumigation. He has also devoted considerable time to the preparation of a Farmers' Bulletin on citrus fumigation which will be issued in the near future.

Dr. E. A. Back, in charge of the Mediterranean fruit fly investigation in Hawaii, recently spent some time in Washington outlining future work in the islands. While in the East Dr. Back also visited Bermuda to investigatte the Mediterranean fruit fly situation.

Mr. W. W. Yothers, in field charge of the white fly spray demonstrations in Florida, was in Washington from February 13 to 17, inclusive, prefecting plans for future work. In addition to the demonstration work, Mr. Yothers, during the past year, has devoted considerable time to the study of the rust mite and its control.

Mr. Frederick Maskew, who was formerly engaged in citrus fumigation experiments with Mr. Woglum in southern California, and now Deputy Quarantine Officer of the State of California, is at present in Washington in the interest of the proposed Mediterranean fruit fly quarantine.